
DISTANCE LEARNING vs. the DUAL CODING THEORY



by Aardvark Bloomingdale
under the direction of his handler, Charlie Dean

Combining PowerPoint with a Hands-on Activity

The Internet is replete with articles about distance learning. But there is relatively little (of real substance) available regarding the pros and cons of the teaching techniques used. Teaching techniques in distance learning classes frequently do not comport with the underpinnings of the Dual Coding Theory, Noam Chomsky's language theory, and other well accepted schools of thought. **My position** (as one of the few aspiring aardvark future librarians) **is that PowerPoint and hands-on activities are a bad mix.**

Many **distance learning classes** as well as non-distance learning classes nowadays have PowerPoint instruction that is sooner or later is followed by hands-on activity. Some teachers have arranged for PowerPoint to be used during the transition time from lecture to hands-on.

Just a bit of history: One of my human handlers told me that when he was in college in the early 1970s in a biology class they were made to watch videos, in a dark room, while taking notes, and then they were tested and allowed to use their notes. Keep this in mind as you read the rest of this.

Were teachers in the distance learning arena to seriously examine their techniques in light of the dual coding theory, Noam Chomsky's contributions, fractal geometry, and other accepted theories, they would find that many of their teaching techniques have very little if any support. When I say “support” I mean reasonable facts and arguments that would tend to show that the teaching techniques make the best use of the student’s time and effort.

I realize that distance learning is just that—distance learning—and some sacrifice must be made to accomplish it at a distance. Having said that, I will attempt connect a few dots:

“The landing [(of an aircraft)] is a transition from flying to taxiing. It demands more judgment and technique than any other maneuver. More accidents occur during the landing phase than any other phase of flying.” [Landing, 2009] A corollary statement can be said about the transition from lecture to hands-on. Teachers have been dealing with

this since the days of blackboards with white chalk, charts, pictures, film strips, film projectors, motion picture films, whiteboards with black markers, videos, and now PowerPoint.

An argument could be made that PowerPoint should be combined with hands-on during some kind of a transition period. I am not aware of any study to support this. I see no evidence that the exercise would be worth the candle. I believe it would be extremely inefficient to use PowerPoint at the same time students are entering text into the search engine for example. I do not doubt that this has been done, but again I see no evidence of it being more beneficial than not. And I do not think it ought to be done just so the teachers can practice PowerPoint. [Bartsch, 2003], [DeAntonio, 2006], [Gwenna Moss, 2009], [Huang, 2007], [Vance, 2009]. The exception here would be if a teacher were to structure his use of PowerPoint so that the student IS confronted with processing a verbal source and a visual source simultaneously, and NOT two verbal sources simultaneously or two visual sources simultaneously.

For decades farmers treated cows for loss of cud, hollow horn, and hollow tail. It took decades for veterinarians to convince farmers that this was crockery, and I don't mean earthenware. Just because folks are doing something does not make it the best option. This ain't no arbitrary aardvark double-talk. [Hand, Brown, and White, 1964]

Research on cognitive processing, and particularly the **dual coding theory**, suggests that **people process verbal and visual via two different modes** and therefore they can process **verbal** and **visual** information simultaneously. So **the audience can simultaneously receive and interpret a picture on a projected PowerPoint slide and a presenter's spoken words with little difficulty**. But, they cannot process two verbal streams of input simultaneously. Keep in mind that text on a PowerPoint is processed as verbal. The written language is a phonetic representation of the sound. So, **the audience cannot read text off slides and simultaneously process a presenter's oral language**. [Vance, 2009. Citing A. Paivio, *Mental Representations: A Dual Coding Approach*, Oxford University Press, New York, 1986.]

There is good argument based on the dual coding theory that a PowerPoint presentation's message ought to be developed as visually as possible, so that the students can better receive the substance of both the PowerPoint and the teacher's oral presentation. [Vance, 2009. Citing E. R. Tufte, *The Cognitive Style of PowerPoint*, Graphics Press, Cheshire, Connecticut, 2003.] Some subjects just do not lend themselves to PowerPoint, and attempts to put a square peg in a round hole could lead to indigestible chunks of information and "chartjunk." [Vance, 2009] I have seen many PowerPoint presentations. Most accomplished almost nothing. The few really good ones were of pictures and no text, while the presenter talked.

Even with **storyboarding** which can involve concomitant verbal and visual elements, the student is a passive participant. To be an active participant the student would have to stop the storyboard and begin hands-on, then stop the hands-on and restart the storyboard, etc. I have tried it, and it is frustrating. I find it highly unlikely that an entire class could

pull it off, starting and stopping in unison.

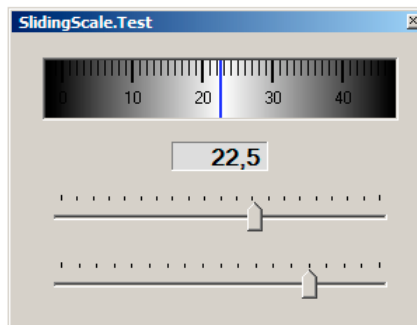
The tools of research are complex and require concentration, and when you factor in eye strain and other distractions, asking students to look back and forth between the computer on their desk and PowerPoint on the big screen at the front of the class is too much. It is kinda like text-messaging while driving, or even walking. I strongly suggest deferring to the preponderance for hands-on activity with no interference from PowerPoint: This deference is of course tempered by future research in this area which I hope folks will do.

Learning and its Analogy to Fractal Geometry

Surely the results of "teaching" do not follow the rules of randomness.

"Without a governing design, method, or purpose; unsystematically: chose a card at random from the deck." "Having no specific pattern, purpose, or objective: random movements." (<http://www.thefreedictionary.com/randomness>)

There is a 1/52 chance of randomly picking the right card out of a deck, and unless you know something I don't this is pure randomness. I would like for you to consider a continuum with complete randomness at one end and complete predictability at the other. Now think about a sliding scale to determine where a teaching technique fits on the continuum; with a teaching technique as the dependent variable and the effects of teaching as the independent variables.



<http://www.codeproject.com/KB/miscctrl/SlidingScale.aspx>

The closer a teaching technique is to the randomness end decreases his chances of being successful. Today in the NetGen age it is too easy to use technology as a substitute for teaching. This makes about as much sense as watching a video about swimming as a replacement for swimming laps.

The 17th century French mathematician **Blaise Pascal** used the laws of probability and the idea of randomness to help in winning card games, roulette, and other activities in which tiny physical variations cause a discrete change in results. [Bear's Lair, 2009] **My premise here is that certain physical activities and variations lead to learning in an un-random way and teachers should use this in their lesson plans, to their students' advantage.**

Since tiny physical variations are themselves unpredictable, their results may appear random. The fact that certain things are unknown to us does not make the outcome random; it is simply that we do not know the outcome. By corollary, learning activities

are unpredictable where no two people have the same experience and their results may appear random. **But just as true randomness almost never holds for economic activities, I submit the same is true for learning activities. Benoit Mandelbrot**, a truly superior mathematician who invented fractal geometry made use of discrete changes with complex nonlinear equations. (A formula containing a variable with an exponent other than one.) While the results may appear chaotic they do not follow the rules of randomness, where all outcomes would be equally likely. Even a blind hog will find an acorn once in a while. If you can manage or monitor the variations even slightly, the outcomes do not follow the laws of randomness. Causing students to have a time-consuming experience is not teaching, even though most students will come out of it with more target skills than they had before. [Bear's Lair, 2009] **I wish Blaise Pascal or Benoit Mandelbrot had written about dog and horse trainers.**

In a nonlinear equation a formula or equation is run many times, and each time one or more variables may be different with a variable's value being obtained from a previous result. Human learning is analogous: As we read a book, we read each page with the knowledge and experience we obtained from the previous page.

Some economic activities are governed by complex underlying equations, impossible for mediocre mathematicians to solve, which produce pseudo-random "chaotic" behavior, in which prices or other variables appear to move randomly but are in reality mostly determinate. The same must be true for learning activities which result in random individual experiences and are impossible to follow through from their premises, but still can produce learning in determinable ways. This is especially so when one considers the **dual coding theory ("DCT")** and **Noam Chomsky's language theory**. [Bear's Lair, 2009] **I wish Mr. Pavio (Papa DCT) and Mr. Chomsky had mentioned dog and horse trainers too.**

Behavioral Science suggest a **shift "away from** the deeper underlying principles and abstract mental structures that might be illuminated by the evidence of behaviour" and a **shift toward** the the evidence of behavior. **Chomsky** likens this to a "**science of meter readings**." [Chomsky, 1968]

Cartesian philosophy seems to make apparent randomness not so random, as **René Descartes's** coordinate system allowed geometric shapes to be expressed in algebraic equations. So again, a phenomenon that is not predictable does not fit the bill of randomness. [Bear's Lair, 2009]

The interaction between economic variables is partly random, partly caused by **inadequacies in our ability** to measure economic quantities quickly, and partly determined by complex **non-linearities**. Similarly, the interaction between student activities and learning is partly random, due to:

- different individual experiences and
- our inadequacies in measurement and
- the complexities of "DCT" and
- the tiny physical variations that underlie **Chomsky's language theory**.

Pretending that **deterministic** (but chaotic) factors are random is an error in fractal geometry. [Bear's Lair, 2009] If teaching/learning factors (the effectiveness of putative learning activities) are not random (although chaotic), they will not obey the laws of randomness and pretending otherwise is also in error.

determinism

the doctrine that everything, including one's choice of action, is the necessary result of a **sequence of causes**

<http://www.yourdictionary.com/deterministic>

Determinism is the philosophical proposition that every event, including human cognition and behavior, decision and action, is causally determined by an unbroken chain of **prior occurrences**.

<http://www.answers.com/topic/determinism>, citing Van Inwagen, Peter, 1983, *An Essay on Free Will*, Oxford: Clarendon Press.

de·ter·min·ism

The philosophical doctrine that every state of affairs, including every human event, act, and decision is the inevitable **consequence of antecedent states of affairs**.

<http://www.thefreedictionary.com/deterministic>

deterministic - an inevitable consequence of **antecedent sufficient causes**

<http://www.thefreedictionary.com/deterministic>

There are other schools of thought that deal with the properties of randomness: [Bear's Lair, 2009]

Monte Carlo simulation:

Monte Carlo methods are useful for modeling phenomena with significant uncertainty in inputs. Monte Carlo methods are a class of computational algorithms that rely on repeated random sampling to compute their results. [Wikipedia]

Value at Risk methodology:

Value at Risk (VaR) is used to measure the risk of loss on a specific portfolio of financial assets over a period of time. It determines whether the loss will exceed the value of the portfolio. [Wikipedia. Note: When I went back later I could not find the same material.]

Black-Scholes options model:

The Black-Scholes formula calculates the price of a call option. This option valuation formula has become the standard method of pricing options. Each time the formula is run, one or more variables may be different. [Black-Scholes, 2009]

If actual teaching (not just moderating) were as profitable as the stock market, I am sure Mr. Black and Mr. Scholes and others would have developed a model for it. Were the calculations of the above three schools of thought to depend on the properties of randomness, they would be quite simply wrong and often very badly wrong. If teachers fail to consider tiny physical variations that underlie the complexities of "DCT" and **Chomsky's language theory**, they will be closer to the randomness end of the continuum and not as effective as they could be.

Just as Wall Street and the economists and "mathematicians" have been fooled by assuming randomness where it did not exist, the opposite could just as easily be true and probably was for decades before the "crash" when the same economists and "mathematicians" were taking credit for favorable results that they had not produced. [Bear's Lair, 2009] Just as teachers can claim credit for "teaching" when their students demonstrate their efficiency, many would be hard-pressed to show how their teaching technique is a link to learning and that it does not depend on randomness. **Just being a "moderator" is not teaching.** It takes an affirmative change of habit and behavior for a moderator to undergo metamorphosis and become a teacher. **"Even a dead fish can go with the flow."** [Jim Hightower]

Sleep Apnea and Stuttering

"A team at UCLA found that nearly 40% of sleep apnea patients it studied also stuttered as children. ... The MRIs revealed a dramatic loss of gray matter -- brain cells -- in the men with sleep apnea. The worst-hit areas were those involved in speech production, movement and emotion. The amount of brain damage **correlated** directly to the severity of sleep apnea. The healthy men's brains were 2% to 18% larger in these areas than the men with sleep apnea." [L.A. Times, 2002]

causation or causality

Noun

1. the production of an effect by a cause
2. the relationship of cause and effect

[<http://www.thefreedictionary.com/causation>]

cor·re·la·tion (kôr-lshn, kr-)

n.

1. A causal, **complementary, parallel, or reciprocal relationship**, especially a structural, functional, or **qualitative correspondence between two comparable entities**: a correlation between drug abuse and crime.
2. Statistics The simultaneous change in value of two numerically valued random variables: the positive correlation between cigarette smoking and the incidence of lung cancer; the negative correlation between age and normal vision.
3. An act of correlating or the condition of being correlated.

(<http://www.thefreedictionary.com/correlation>)

as·so·ci·a·tion (-ss-shn, -sh-)

n.

1. The act of associating or the state of being associated.
 2. An organized body of people who have an interest, activity, or purpose in common; a society.
 3.
 - a. A mental connection or relation between thoughts, feelings, ideas, or sensations.
 - b. A remembered or imagined feeling, emotion, idea, or sensation linked to a person, object, or idea.
 4. Chemistry Any of various processes of combination, such as hydration, solvation, or complex-ion formation, depending on relatively weak chemical bonding.
 5. Ecology A large number of organisms in a specific geographic area constituting a community with one or two dominant species.
- (<http://www.thefreedictionary.com/association>)

The words "link" and "producing cause" are technical terms and I was not able to find to my satisfaction a layman example of either.

If doctors can ever show definitively that the same brain damage that produces stuttering in younger years also produces sleep apnea later on, they will have shown a link. Or if they can show that the mechanism that causes brain damage also causes sleep apnea, they will have shown a link.

All the experts have so far is a correlation. Putting an assertion in a title of an article ("Researchers link sleep apnea and stuttering") does not make it so. [L.A. Times, 2002]

Asbestos and Smoking

For years experts argued about whether exposure to asbestos and smoking could be linked to health problems. They all knew there was a correlation but that was not enough, to goad us into action for decades.

My Point

I told these stories to make a point about teaching techniques, or lack thereof as the case may be. One could argue about whether a physical activity (tiny physical variation) **causes** learning, or is a **producing cause**, or a **link**, or merely a **correlation** or an **association**. *Or one could admit that learning does not fit the pattern of randomness and try to use that to the students' advantage.*

A **moderator** manages a class, a meeting, etc. A **teacher** considers time expectancies (students' and teacher's) and balances this against learning expectations. It would be nice if we could learn through the process of osmosis. I could hold a physics book and wait for some unpredictable, chaotic, and apparently random learning. I'd be a smart aardvark!

Learning is not random, though it may as well be for some teaching techniques. It is too easy to dismiss a correlation simply because we cannot predict an outcome. Best

learning expectations do not occur as a result of teaching techniques that use technology in a way that increases the amount of time students expend to learn skills while lessening the time teachers expend teaching those same skills. This could give new meaning to the word "**arbitrage**," where the teacher abuses the situation by using different methods and formats to exploit the students' time to save his own. Such leveraging of the teacher's time is an extremely expensive process on the student. If this is not malice aforethought, it is at least serious negligence or recklessness.

Today using technology while teaching has become a de facto requirement. It seems as though presenters would be embarrassed if they did not use at least as much technology as the preceding presenter. The use of technology while teaching might be an end in itself. **A teacher is empowered with considerable authority and is usually given a preponderance that his teaching method is the best.** When it becomes apparent that teaching is lacking, students have little recourse. This is frequently a severe problem in distance learning courses. Teaching is a profession where poor teaching results can be excused because we defer to the preponderance that the teaching method is appropriate, essentially a fact-free but iron-clad assessment.

There should be a mechanism in place, perhaps a rubric, for teachers to create a preponderance that their teaching methods not only provide reasonable value for the price in money and time paid by students but also that they are the best methods, and if not why. This may sound draconian, but as a future librarian I want to know that I am providing a worthwhile service to the public, and I would like to have a simple standard that even an aardvark could follow.

When I say "teacher" and "student," I could just as easily say "librarian" and "patron." Libraries are becoming more and more distance access facilities. Many librarians use headsets so they will be hands-free when talking to patrons, and many patrons use headsets also so they can type on their computer while talking. I certainly do.

Libraries and University distance learning programs are fee based-info-services. Let's look at some other fee based-info-services:

• ACS Publications • Alacra, Inc. • AP Digital • Bloomberg, L.P. • Comtex News Network • Consumer Reports • CSA • D&B • Delphion, Inc. • EBSCO Information Services • ECNext • Edgar • Elsevier Science • Factiva • FluentMedia • Gale Group • Hoover's, Inc. • Ingenta • Internet Securities, Inc. • LexisNexis • Media General Financial Services • OCLC, Inc. • OneSource Information Services, Inc. • Ovid • ProQuest • Questel • Orbit • Reuters • STN International • Thomas Derwent • Thomson Dialog • Thomson ISI • Thomson West • Dow Jones.

I know these offer quick telephone reference assistance and telephone training sessions. Libraries and University distance learning programs are based-info-services and I am puzzled why their services lag far behind. Libraries and University distance learning programs are not riding the crest of any wave that I can see. Just out of curiosity I called

Gale Group and I spoke to a reference assistant. She had experience with distance learning and said she had experienced the same frustration.

If I, as an information specialist, can increase the amount of time it takes for a patron to receive information from me then I have increased the time that I may work, and be paid for of course. If the information is in demand, it is easy to imagine how a group of information specialist could use ineffective methods for transferring information to their advantage. I do not believe this requires further elucidation. Maybe somebody with better arithmetic skills than an aardvark could do a cost-benefit analysis from the student's perspective. I'd like to see it.

There should be a mechanism in place, perhaps a rubric, for teachers to create a preponderance that their teaching methods not only provide reasonable value for the price in money and time paid by students but also that they are the best methods. This may sound draconian, but **as a future librarian I want to know that I am providing a worthwhile service to the public, and I would like to have a simple standard that even an aardvark could follow.**

REFERENCES:

Bartsch R, Cobern K. Effectiveness of PowerPoint Presentations in Lectures. Computers & Education [serial online]. August 01, 2003;41(1):77-86. Available from: ERIC, Ipswich, MA. Accessed April 27, 2009.

Black-Scholes option pricing formula. Retrieved May 22, 2009, from QuickMBA, Finance Web site: <http://www.quickmba.com/finance/black-scholes/>

Carello, Christy (2002, 11 27). Hi-Tech Presentations: Are They Powerful or Pointless?. Retrieved April 27, 2009, from University of Wisconsin Web site: <http://www.uwsa.edu/ttt/articles/carello.htm>

Noam Chomsky (1968), Source: Language and Mind publ. Harcourt Brace Jovanovich, Inc., 1968. One of the six lectures is reproduced here; Transcribed: in 1998 by Andy Blunden, proofed and corrected February 2005. Language and Mind-Linguistic Contributions to the Study of Mind (Future). Retrieved May 23, 2009, from Marxist Internet Archive Web site: <http://www.marxists.org/reference/subject/philosophy/works/us/chomsky.htm>

DeAntonio, M. Sandoval, L.M. Arceo, R., (2006, October 31). Work in Progress: A Quantitative Study of the Effectiveness of PowerPoint in the Classroom. In Frontiers in Education Conference, 36th Annual [Web]. from <http://fie-conference.org/fie2006/papers/1513.pdf>

Gwenna Moss Centre For Teaching Effectiveness. Class notes: function, availability online, Powerpoint slides. Retrieved April 27, 2009, from The University of Saskatchewan Web site: <http://www.usask.ca/gmcte/drupal/?q=node/222>

Hand, W, Brown, F, & White, N (1964). *Popular beliefs and superstitions from North Carolina: Popular Beliefs and Superstitions from North Carolina*. Pages 447-(ISBN 0822302594, 9780822302599): Duke University Press.

http://books.google.com/books?id=Oudc1sjV6cgC&pg=PA449&lpg=PA449&dq=hollow+horn+tail&source=bl&ots=GqrM8pqrQw&sig=fTmXlKegkfvoke0lk-44tF9O48E&hl=en&ei=ioAuSr7kCZGIAPDnLzECA&sa=X&oi=book_result&ct=result&resnum=2#PPA449,M1

Huang, Nansong. "Is the Use of PowerPoint More Effective in Teaching Chinese or Is It Just Fancy?" Paper presented at the annual meeting of the American Council on the Teaching of Foreign Languages, Henry B. Gonzalez Convention Center, San Antonio, TX, Nov 12, 2007 [Abstract only]. 2009-04-27
http://www.allacademic.com/meta/p182047_index.html

Hutchinson, M (2009, 05 20). The bear's lair - the wreck of modern finance. Retrieved May 22, 2009, from Asia Times Web site:
http://www.atimes.com/atimes/Global_Economy/KE20Dj02.html

Landing. Retrieved April 27, 2009, from PilotFriend Web site:
http://www.pilotfriend.com/training/flight_training/fxd_wing/landing.htm

Los Angeles Times. (2002, 11 19). Researchers link sleep apnea and stuttering. Retrieved 05 22, 2009, from <http://articles.latimes.com/2002/nov/19/nation/na-apnea19>

Vance V. Comparing PowerPoint Experts' and University Students' Opinions about PowerPoint Presentations. Technical Communication [serial online]. February 2009;56(1):93-93. Available from: Academic Search Complete, Ipswich, MA. Accessed April 27, 2009. <http://catshuler.net/engl421fa08/sites/default/files/Powerpoint.pdf> [This is a good DO and DON'T article.]

Wikipedia, <http://en.wikipedia.org/>,
http://en.wikipedia.org/wiki/Monte_Carlo_method,
http://en.wikipedia.org/wiki/Value_at_Risk_methodology

BIBLIOGRAPHY:

Animal learning. (2009). In *Encyclopædia Britannica*. Retrieved June 09, 2009, from Encyclopædia Britannica Online:

<http://www.britannica.com/EBchecked/topic/1349539/animal-learning>

Note: For a free copy go to

<http://www.britannica.com/EBchecked/topic/1349539/animal-learning>

Click the print icon & get a 60-page document.

[See animal learning (zoology) -- Britannica Online Encyclopedia.pdf]

Dean, Charlie (2009, Spring Semester). CDean.Bibliographic.Instruction.doc. SLIS 5615 Electronic Databases & Info Sciences at UNT.

Digital Tutorial Webinar.pdf (2,519.0k),
http://www.webjunction.org/c/document_library/get_file?folderId=28842469&name=DLFE-6290001.pdf

Internet, generally for reviewing definitions and meanings of words and phrases.

Marx, Karl (1847, 12). Wage Labour and Capital, the original 1891 pamphlet, translated by Frederick Engels, first published (in German) Neue Rheinische Zeitung, April 5-8 and 11, 1849. Retrieved June 8, 2009, from Marxist Internet Archive Web site:
<http://www.marxists.org/audiobooks/index.htm>

Searcher's Toolkit, part 1, lu.com/bellsearch/lectures/Lecture2.ppt

Teaching Tips Index,
<http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/teachtip.htm>

University of North Texas's E-resources, generally, <http://www.library.unt.edu/>

WebJunction Course Development Suggestions, <http://ga.webjunction.org/instructional-design>
